Remarks

The present amendment responds to the Official Action dated January 31, 2007. A petition for a one month extension and authorization to charge Deposit Account No. 50-1058 the one month extension fee of $120 accompany this amendment. The Official Action objected to claims 7-20 under 37 CFR 1.75(c) as being improper multiple dependent claims. Claims 1, 5 and 6 were rejected under 35 U.S.C. 103(a) based on Kato et al. U.S. Patent No. 6,805,105 (Kato). Claims 1-6 were also rejected on the grounds of nonstatutory obviousness-type double patenting over claim 8 of U.S. Patent No. 6,955,156. These grounds of rejection are addressed below following a brief discussion of the present invention to provide context. Claims 7, 9, 11, 15 and 19 have been amended to correct their claim dependencies and to address the Section 1.75(c) objection. Claims 1-20 are presently pending.

Claim Dependency Objections

The claim dependency has been corrected by this amendment.

Invention of Claim 1

The invention of claim 1 has the following constitutional features as defined in the claim:

(a) the remaining fuel retrieving means being constructed to cause forced circulation of the liquefied gas fuel in the fuel tank back so as to again return the liquefied gas fuel to the fuel tank through an aspirator,

(b) and retrieve the liquefied gas fuel remaining in the injection pump to the fuel tank by suction force produced in a suction port of the aspirator by the forced circulation,

(c) the suction port of the aspirator being disposed at a position lower than an area in the injection pump in which the liquefied gas fuel remains (emphasis added)

As further explained at page 4, lines 17-29, page 27, lines 25-32 and page 28, lines 25-38 of the specification, features a), b) and c) cooperate as follows to achieve a variety of advantageous operational results as discussed in detail below.

According to the invention of claim 1, the suction port of the aspirator is disposed at a position lower than the area in the injection pump in which the liquefied gas fuel remains. Namely, an area in each of the fuel gallery and the overflow fuel pipe in which the liquefied gas fuel remains after the stop of the liquefied gas fuel supply device is disposed at a position higher than the suction port of the aspirator. Accordingly, the liquefied gas fuel remaining in the area is retrieved to the fuel tank by a combined force of gravity and the suction force produced by the circulation of the liquefied gas fuel, whereby it is possible to more efficiently retrieve liquefied gas fuel remaining in an injection system, by using gravity. Accordingly, it is possible to achieve the effect and advantage of reducing time taken to retrieve the liquefied gas fuel in the injection system to the fuel tank after the stop of the diesel engine. (emphasis added). Page 4, lines 17-29.

Further, DME fuel liquid is circulated via the aspirator 7 (symbol D). The DME fuel remaining in the fuel gallery 11 in the injection pump 1 as well as in the overflow fuel pipe

81 upstream of the overflow valve 82 is vaporized, i.e., substituted by a vapor phase, by suction force produced by the flow of DME fuel which flows from the inlet 7a to the outlet 7b through the circulation of the remaining DME fuel, and is sucked through the suction port 7c and absorbed into the DME fuel flowing from the inlet 7a to the outlet 7b, and is retrieved to the fuel tank 4 (symbol E). (emphasis added). Page 27, lines, 25-32.

In addition, in the DME fuel supply device 100 according to the invention of the present application, since the aspirator 7 is disposed at a position lower than the fuel gallery 11 and the overflow fuel pipe 81, the DME fuel remaining in the fuel gallery 11 and the overflow fuel pipe 81 is retrieved to the fuel tank 4 by a combined force of gravity and the suction force produced in the suction port 7c of the aspirator 7. Accordingly, it is possible to more efficiently retrieve the DME fuel remaining in the injection system by using gravity, and it is possible to further reduce time taken to retrieve the DME fuel in the injection system to the fuel tank 4 after the stop of the diesel engine. (emphasis added) Page 28, lines 25-34.

Thus, the device of claim 1 is provided with an aspirator, such as aspirator 7 disposed in the circulation passage (which is comprised of the lines 5 and 53 in Fig. 4, for example) for forcibly circulating the DME fuel (liquefied gas fuel). It should be noted that the inlet 7a and the outlet 7b of the aspirator 7 are disposed to constitute a part of the circulation passage, for example, as seen in Figs. 1-4. (emphasis added).

Further, the device of claim 1 is characterized in that the suction port 7c of the aspirator 7 is located at a position lower than the area where the residual DME fuel to be to be

recovered is present. (emphasis added).

The aspirator here has an inlet, an outlet and a suction port, and functions to create a negative pressure or vacuum in the suction port by allowing a fluid to flow from the inlet to the outlet at a high speed, and to create a suction force with the negative pressure in the suction port to draw fuel to be recovered.

Such an aspirator has an advantage in that a suction force is obtained without resorting to a driving source. However, without more, the aspirator has a problem of requiring a long time to suck the entire amount of the fuel to be recovered, because the suction force is weak compared to that produced by pumps or the like having driving sources. See the text of page 3, lines 7-9 of the specification, which explains "This is because the suction force by the aspirator having no driving source is weak compared to pumps or the like having driving sources." (emphasis added).

In the device of claim 1, the aspirator 7 is further disposed such that its suction port 7c is located at a position lower than the area where the residual DME fuel to be sucked is present, so that the resultant force of gravity due to the difference in height and the suction force produced in the suction port 7c of the aspirator 7 cooperate to recover the residual DME fuel in the area to the fuel tank. Therefore, the weak suction force of the aspirator by itself is enhanced by adopting a relatively simple construction to provide a strong suction force. In this way, it is possible to achieve reduction of time required to suction the entire amount of the residual DME fuel. (emphasis added).

If the suction port 7c of the aspirator 7 was located at a position higher than the

area where the residual DME fuel to be sucked is present, the DME fuel which is a liquefied gas fuel would vaporize on the liquid surface in the area, which would increase the volume thereof about 400 times and therefore would make it impossible to efficiently suck the residual DME fuel. (emphasis added).

Thus, the construction of the claimed device in which the suction port 7c of the aspirator 7 is disposed at a position lower than the area where the residual DME fuel is present has the above-described peculiar technical significance, an enhancement of the suction force and reduction of the suction time, which is believed to be highly advantageous and non-obvious.

The Art Rejection of Claim 1

As addressed in greater detail below, Kato does not support the Official Action's reading of it and the rejections based thereupon should be reconsidered and withdrawn. Further, the Applicants do not acquiesce in the analysis of Kato made by the Official Action and respectfully traverse the Official Action's analysis underlying its rejections.

Kato neither discloses the "aspirator", nor does it teach "forced circulation" as claimed by claim 1 of the present invention.

More specifically, the Official Action suggests that "fuel selector valve 18" of Kato corresponds to "aspirator 7" of the claimed invention. This analysis is not correct, as is evident from the above explanation, the fuel selector valve 18 of Kato is a three-way valve, and does not function like aspirator 7 or the aspirator of claim 1. Valve 18 does not create a negative pressure or vacuum in the suction port by allowing a fluid to

flow from the inlet to the outlet at a high speed, and does not create a suction force with the negative pressure in the suction port to draw up residual fuel.

The Official Action also suggests that "compressor 27" of Kato is operable to forcibly circulate the liquefied gas fuel in the fuel tank. However, Kato is completely silent on "forced circulation," and one of ordinary skill in the art would not understand Kato's compressor 27 as operating to forcibly circulate the liquefied gas fuel.

Accordingly, claim 1 is believed to be patentable over Kato and should be promptly allowed.

Claims 5/1 and 6

For the same reasons as stated in relation to claim 1, the invention of each of claims 5/1 and 6 is believed to be patentable over Kato.

Nonstatutory Double Patenting Rejection

Applicants do not agree that there is a double patenting problem between claim 1 and claim 8 of U.S. Patent No. 6,955,156, in view of the constitutional features and technical significance of the claimed aspects of claim 1 that have been discussed above. Nevertheless, a terminal disclaimer is filed herewith to expedite allowance.

Conclusion

All of the presently pending claims, as amended, appearing to define over the applied references, withdrawal of the present rejection and prompt allowance are requested.

Respectfully submitted,

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